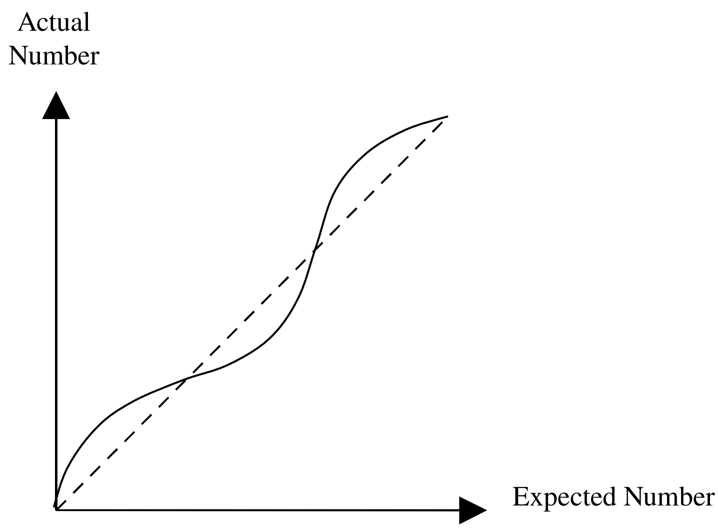
Networked Life
CIS112
Spring 2008
Prof Michael Kearns

Problem Set #2
Due at the start of lecture, Thu April 17

1) (15 points) Describe a real-world "market for lemons" different from those discussed in lecture or by Schelling. What are the specific properties that make it a market for lemons, and what effects do they have on the market's dynamics? What mechanisms could be put in place to change these dynamics? In your answer, be sure to discuss information asymmetry and how it applies to the market you've chosen.

2) (15 points) As evidenced by many examples in Schelling's book, individual preferences can lead to globally undesirable outcomes --- for example, traffic jams resulting from rubbernecking, sub-optimal seating arrangements, and self-segregated housing. Give an example not mentioned in lecture or by Schelling in which individual preferences and choices lead to a globally undesireable outcome. Additionally, discuss what mechanisms or forces prevent people from changing or escaping this outcome.

3) Part A (10 points) On the figure below, list all points which are stable equilibria and all points which are unstable equilibria.



Part B (10 points) Consider the following rule that a person might use for deciding whether to go to the beach: If the person exects many people to be at the beach then the person will choose to stay home; and conversely, if the person expects few people to be at the beach, the person will go to the beach. Draw and annotate a figure like that in Part A which shows that if everybody adopts this rule, the system can oscillate indefinitely (never reach an equilibrium) such that on alternate days, there are few/many people at the beach.

4) (20 points) Consider a game in which two players, a "Row" player and a "Column" player, each have three pure strategies available. Row's pure strategies consist of "top", "middle" and "bottom," and Column's pure strategies consist of "left", "center" and "right." The game can be described by a 3x3 table whose cells are of the form (i, j) where i is the payoff to the Row player and j is the payoff to the Column player. For example in Game 1 (below), when the Row player plays Top and Column player plays Center, the payoff to Row player is 3 and the payoff to Column player is 2.

	Left	Center	Right
Top	(1,2)	(3,2)	(2,1)
Middle	(2,2)	(1,1)	(6,1)
Bottom	(0,7)	(2,2)	(5,7)

Game 1

	Left	Center	Right
Top	(1,6)	(1,7)	(2,1)
Middle	(2,1)	(3,2)	(6,1)
Bottom	(0,4)	(4,3)	(5,7)

Game 2

Find all pure strategy Nash equilibria for Games 1 and 2, or indicate that none exist, and justify your answers.

5) (15 points) Give three reasons why Nash equilibria are of only limited use in understanding how real people behave in game-theoretic scenarios. What short-comings of classical game theory does behavioral game theory try to address?

6) (15 pts) Consider the distributed graph coloring game discussed in lecture. How might players change their strategies if the payoff structure was altered so that people were payed in proportion to the number of neighbors with different colors? Do you think this alternative payoff structure would make it easier or harder for players to find a perfect coloring of the graph (where a perfect coloring is one where no edge has both of its two vertices colored the same) and briefly explain why.